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REVIEW ARTICLE

Clinical Observation of Early Tracheotomy in the Treatment of Craniocerebral Trauma

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ABSTRACT **Objective:** To investigate the clinical effect of early tracheotomy in treatment of severe craniocerebral trauma. **Method:** 42 patients of 24 h with traumatic brain injury before tracheotomy were treated as early group, 39 patients with 24 h trauma after tracheotomy were treated as conventional group. Polyvinyl chloride (PVC) tracheotomy tubes were used on all the patients. **Results:** The treatment time in the early group was significantly shorter than the conventional group. The mortality and the incidence of adverse reactions were significantly lower than that of the conventional group, and the difference was significant between the groups ($p < 0.05$). **Conclusion:** The efficacy and prognosis of early tracheotomy in patients with severe traumatic brain injury, surgical treatment are good and it is worthy of clinical application.

KEYWORDS

Early tracheotomy

Open cranial surgery

Craniocerebral trauma

1. Introduction

Craniocerebral trauma is a very common clinical severe trauma. The condition is complex while the mortality rate and disability rate is high. The early symptoms of hypotension and hypoxia can keep patients with respiratory tract, improve cerebral perfusion, prevent and cure the disease. 81 cases of severe traumatic brain injury patients according to the different time of tracheotomy were recruited from our hospital from January to December 2014. The data was compared, analyzed and presented in the manuscript.

2. Materials and methods

2.1. General information

The 81 patients who were recruited in our hospital were treated with tracheotomy. All patients underwent computed tomography (CT) scan. The 20 mins 4D ultrasound scan confirmed that the head injury (intracranial hemorrhage and midline shift were more than 1 cm and the Glasgow Coma Scale (GCS) score was less than 8 points and the average was 24.33 ± 3.53 h. According to the time of tracheotomy, 39 cases of 24 h after trauma were performed in the early group, and 42 cases with 24 h after trauma. In early stage, 39 patients were male and 21 female, aged 14–79 years with average age of 48.52 ± 3.71 years, average GCS score of 5.42 points, 1.22 cases, 29 cases, 16 cases of traumatic injury, 10 cases of traumatic brain injury, 9 cases of brain stem injury, 4 cases of epidural hematoma, 10 cases of severe subdural hematoma combined with 20 min to 24 h. 23 cases were sustained after injury, 11 cases were unilateral and 2 cases were bilateral. In the conventional group, there were 28 male and 3.31 female patients, aged 15–81 years, average 48.66 years old, 17 years old, average GCS score of 5.23 points, 1.49 cases, 27 cases, 15 cases of traumatic brain injury, 13 cases of traumatic brain injury, 10 cases of CT, 42 cases of epidural hematoma, 6 cases of treatment. There were 22 patients with persistent coma after injury, 13 cases with unilateral pupil, 2 cases with bilateral pupil, and two groups of patients in age, gender, disease causes and other general information, ($p > 0.05$), no significant clinical differences [1].

2.2. Method

PVC tracheal incision was applied for all patients as the disposable tracheal catheter incision is the conventional incision. The patients were placed under the shoulder pillow, supine position with center head thrown back and the procedure was performed according to the illness. The local infiltration anesthesia or general anesthesia with endotracheal intubation was applied along the lower edge of the thyroid cartilage to the sternum fossa incision, followed by

doi: 10.18686/aem.v4i4.5

Received: August 23, 2015; Accepted: November 12, 2015; Published online: December 30, 2015

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incising the skin and subcutaneous tissue along the midline separated sternum sternohyoid and thyroid muscle. The exposed tracheal area was achieved through splintering with a knife in the 2–4 tracheal ring from down to open two tracheal ring and tracheal cannula. The incised trachea was left to open till the patient consciousness has improved, cough reflection, the ability to swallow, reduced sputum, efficient breathing, normal oxygen saturation and then extubation of tracheotomy pipe. However, after extubation the incision was left open without suturing for the convenience of the later administration and it is covered with vaseline gauze. Among them, 39 cases were treated with tracheotomy 2 h to 30 min after injury while 42 cases were treated with early tracheotomy or delayed incision [2,3].

Other treatments in all patients before and after surgery were based on the guidelines of the clinical treatment of craniocerebral trauma patients admitted to the hospital. The treatment was according to the criteria of the implementation, physical condition, degree of injury, coma, respiratory stability and preliminary estimation of recovery from patient's prognosis. The given symptomatic care are as follows; preoperative dehydration, diuresis and other measures to reduce intracranial pressure; post operation and nursing measures were completed by the same kind of medical personnel, postoperative continuous monitoring was limited to conditions, pupillary changes, changes of intracranial pressure monitor continuous lumbar puncture rough, timely suction, oxygen and other conventional nursing, combined with the patient's respiratory status, blood oxygen monitoring and arterial blood gas analysis results, followed by the appropriate treatment of mechanical ventilation.

2.3. Curative effect judgment

Both groups of patients were compared in terms of receiving treatment time, adverse reaction rate and mortality rate, the prognosis of patients with GDL to determine the good, middle and severe disability, severe disability, plant survival and death or give up the treatment of five levels [4].

2.4. Statistical methods

SPSS 17.0 statistical software was used for data processing, measurement data using mean + standard deviation ($x + s$) said, with count data rate (%) said, count data using x^2 test, the significance level $a = 0.05$, $p < 0.05$ said the difference has statistical significance.

3. Results

All patients continued to receive the treatment. The treatment time of early group was significantly shorter than that in the conventional group. The prognosis of the early group was good in 9 cases, 11 cases were moderate, severe disability in 8 cases, 7 patients were in vegetative state and death in 4 cases. A total of 12 cases of adverse reactions occurred, including 5 cases of prolapse of casing, dysphonia (4 cases) and pulmonary infection in 3 cases, For the conventional group, 5 cases were good, moderate disability in 10 cases, severe disability in 7 cases, plant survival in 8 cases and 12 cases of death. A total of 22 cases of adverse reactions occur, including 6 cases of prolapse of casing, articulation disorders in 7 cases, 9 cases of pulmonary infection; mortality of two groups and the incidence of adverse reaction differences were statistically significant ($p < 0.05$). Table 1 shows the specific data.

Table 1. Data comparison of three groups of patients.

Group	Receiving treatment time (d)	Death rate (n/%)	Adverse reaction rate (n/%)
Early group n = 39	22.48 ± 4.2	4 (10.26%)	12 (28.57%)
Conventional group n = 42	34.34 ± 4.6	12 (28.57%)	22 (52.38%)
t/x^2	t = 12.0879	x^2 = 4.2794	x^2 = 3.8779
p	$p < 0.05$	$p < 0.05$	$p < 0.05$

4. Discussion

Traumatic brain injury (TBI) is a type of head cranial trauma, belonging to a common injury in the human brain due to wounds and bruises from a fall. The skull trauma occurs frequently in disaster, war or traffic accidents [5]. Brain trauma is a human body injury in an extremely important form of trauma. Brain injury can be divided into three categories: soft tissue injury, skull injury and intracranial tissue damage. However, these three kinds of damage usually appear in the form of merger. Open craniocerebral trauma (mainly refers to the brain tissue after wound and the outside air in the form of air) will have a huge impact on the patient's head. Usually, prognosis of the patients is very important to the damage of the brain. If the brain injury lies in the special physiological function of human brain tissue, it causes human body to endure trauma apart from highest mortality rate [6]. In view of this, the brain trauma patients were rescued and effective treatment has practical significance. Apart from the high rate of brain injury, patients often have severe consciousness obstacle, the independent breath away, the airway secretion is difficult, swallowing, cough reflex weakened or even disappeared and vomiting or stomach contents reflux and other symptoms. An early tracheotomy can reduce the oral and laryngeal structure damage, easy to suction, mechanical ventilation, drug treatment and routine nursing, reduce lung infection rate. If the symptoms of patients is not treated in time after a period of time with tracheotomy, the prognosis and rehabilitation of patients would be poor [7].

Prolapse of casing group at 24 h after injury to the observation of the efficacy of the clinical trials show that the early group tracheotomy were good in 9 cases, disability in 11 cases, severe disability in 8 cases, paralyses in 7 cases, and death in 4 cases. A total of 12 cases of adverse reactions in

which casing extrusion in 5 cases, dysphonia in 4 cases and pulmonary infection in 3 cases. Conventional treatment group showed good in 5 cases, disability in 10 cases, severe disability in 7 cases, paralyze survival in 8 cases and death in 12 cases. A total of 22 cases of adverse reactions, including 6 cases of dysphonia in 7 cases, pulmonary infection in 9 cases, patients receive treatment time was significantly shorter than in the conventional group patients, mortality and adverse reaction rate was significantly lower than normal group ($p < 0.05$). This shows that early tracheotomy in the clinical treatment of brain trauma is better, the patients with craniocerebral trauma should be treated as soon as possible after the trachea incision.

Scalp usually found in the surface of the head especially with patients with brain injury and the scalp is the first part of the damage. Under certain circumstances, the simple scalp injury to patients causing not too big effect, but it can be accurate and prompt the cranial trauma injured point and the focal point. However, by the analysis of cranial trauma injury types and severity of injury, scalp injuries had become clinical judgment for important direction of the skull injury. Thus, in the course of treatment for the scalp trauma patients, doctors need to identify appropriately whether patients with brain trauma.

In conclusion, more advantages for the early tracheotomy in patients with craniocerebral trauma, with significant treatment effect, compared to the late treatment. Moreover, early treatment can protect patients against late recovery, and improve patient life quality. Hence, the early tracheotomy has significant clinical value.

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